Sedimentation:
How it happens and what do to about it

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Sedimentation

Merriam-Webster says:

sedimentation - *noun*

The natural process in which material (such as stones and sand) is carried to the bottom of a body of water and forms a solid layer

Wikipedia says:

"**Sedimentation** is the tendency for particles in suspension to settle out of the fluid in which they are entrained and come to rest against a barrier."

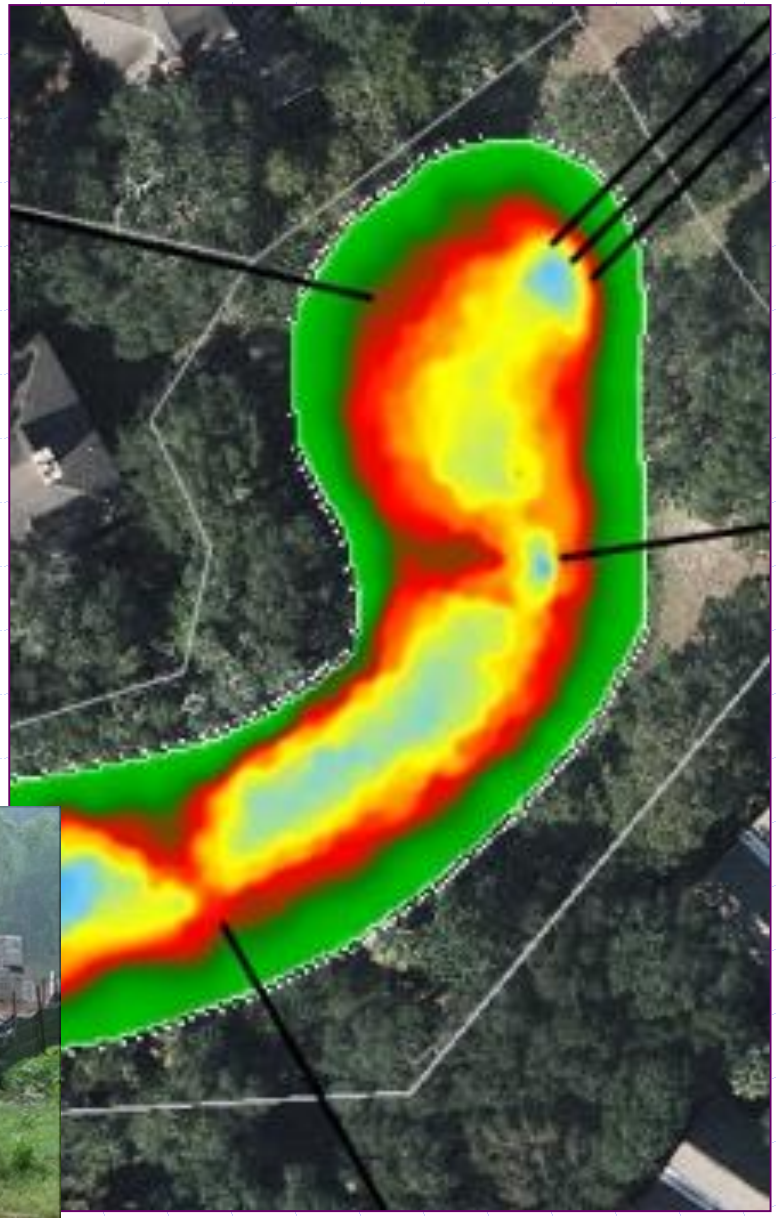
Sedimentation

For stormwater ponds "sedimentation" seems to be a term for any kind of material entering a pond and causing it to become more shallow

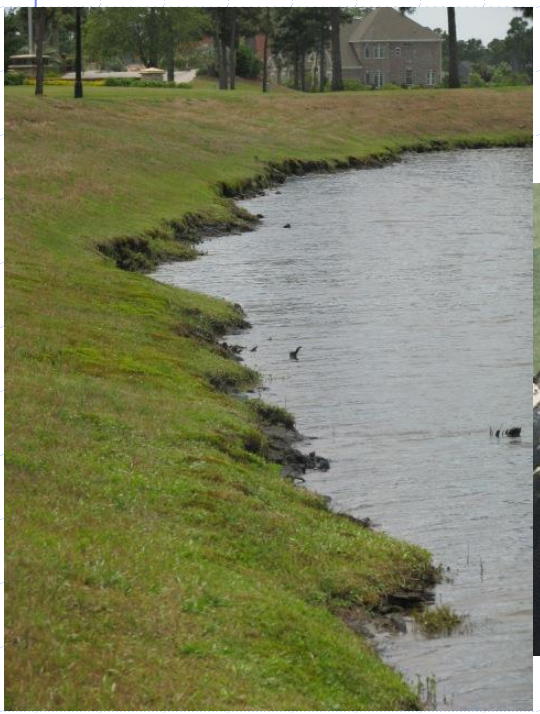
So….
what is the material and where does it come?

And…
what are some of the considerations for removal of this material?

Traditional Sources



Traditional Sources



Non-traditional Sources

Plants, both aquatic....

Non-traditional Sources

- ....and terrestrial

Initial Considerations for Addressing Sedimentation

- Evaluate your ponds
- Funding
- Permitting

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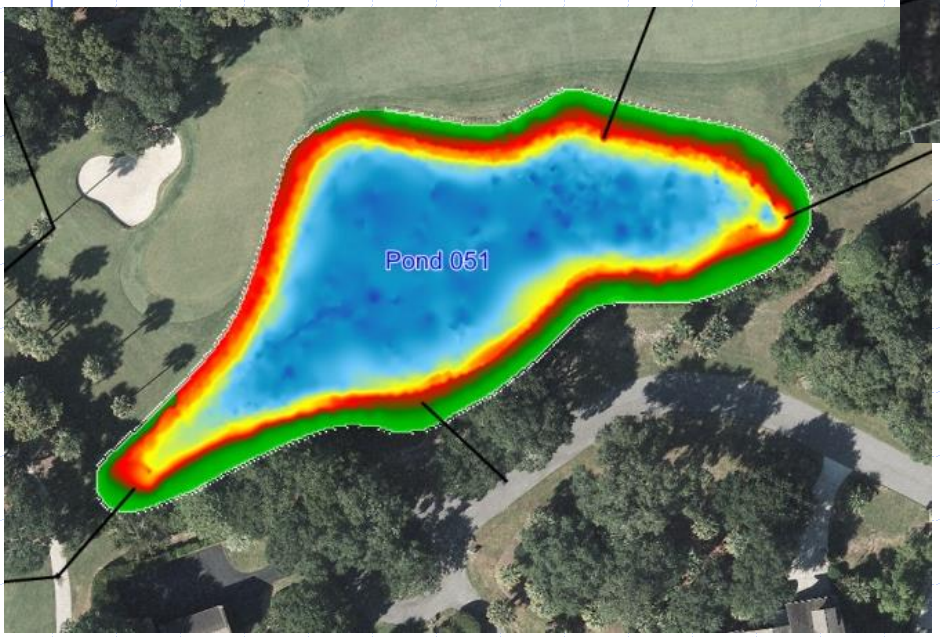
Bathymetry or Bottom Mapping



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Permitting

- DHEC-OCRM and USACE
- Maintenance vs. Nationwide permit
- Consider working with an environmental consultant

Sedimentation Removal Considerations

- How big of an area and what is the volume of material?
- Is the pond able to be isolated and dewatered?
- Can the pond's stormwater function be bypassed?
- How deep is the water where removal will occur?
- What is the accessibility to the pond?
- Is there a staging area available for removed material?

Methods of Removal

- Draining and excavating - “in the dry”
- Excavation without draining - “in the wet”
- Floating dredges
- Submerged dredging

Draining and excavating

Draining and excavating

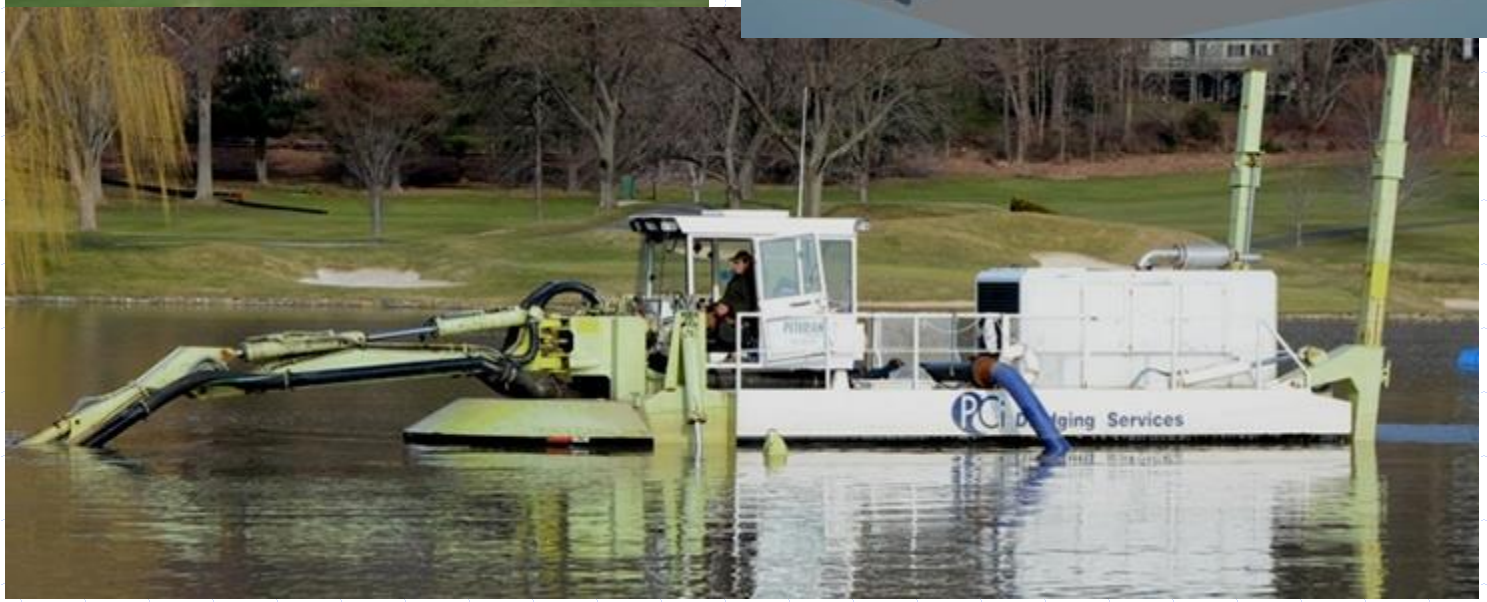
- Best suited if material needs to be removed from entire pond
- Low cost/volume removed if volume is large
- Depth of pond is generally not a limiting issue
- Accessibility can be an issue
- Staging of material is typically not an issue
- Requires that pond be able to be isolated and dewatered
- Requires that pond's stormwater function be able to be bypassed
- Work typically performed by excavators, dozers, pans and dump trucks

Excavation without draining

Excavation without draining

- Best suited for targeted material removal or if pond is relatively small
- Low cost/volume removed if volume is not large
- Depth of pond is a limiting issue
- Accessibility can be an issue
- Staging of material is typically not an issue
- Does not require that pond be able to be isolated and dewatered
- Does not requires that pond's stormwater function be bypassed
- Work typically performed by excavators and dump trucks

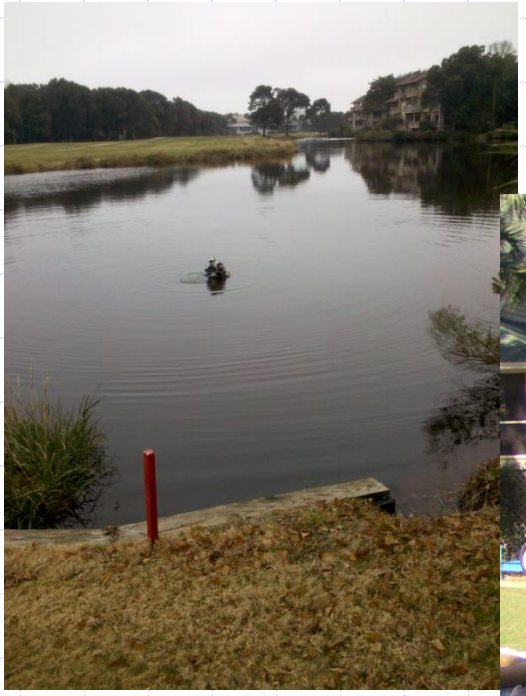
Floating dredges



Floating dredges

- Can perform small and large removal operations
- Moderate cost/volume removed irrespective of project size
- Depth of pond is not generally a limiting issue
- Accessibility is not an issue
- Staging of material can be an issue
- Does not require that pond be able to be isolated and dewatered
- Does not requires that pond's stormwater function be bypassed
- Work typically performed by portable floating dredge

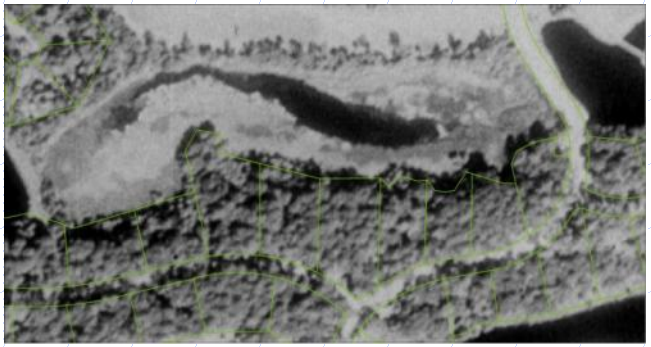
Submerged dredging

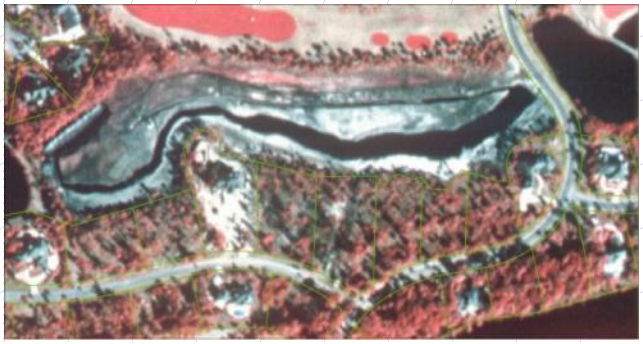


Submerged dredging

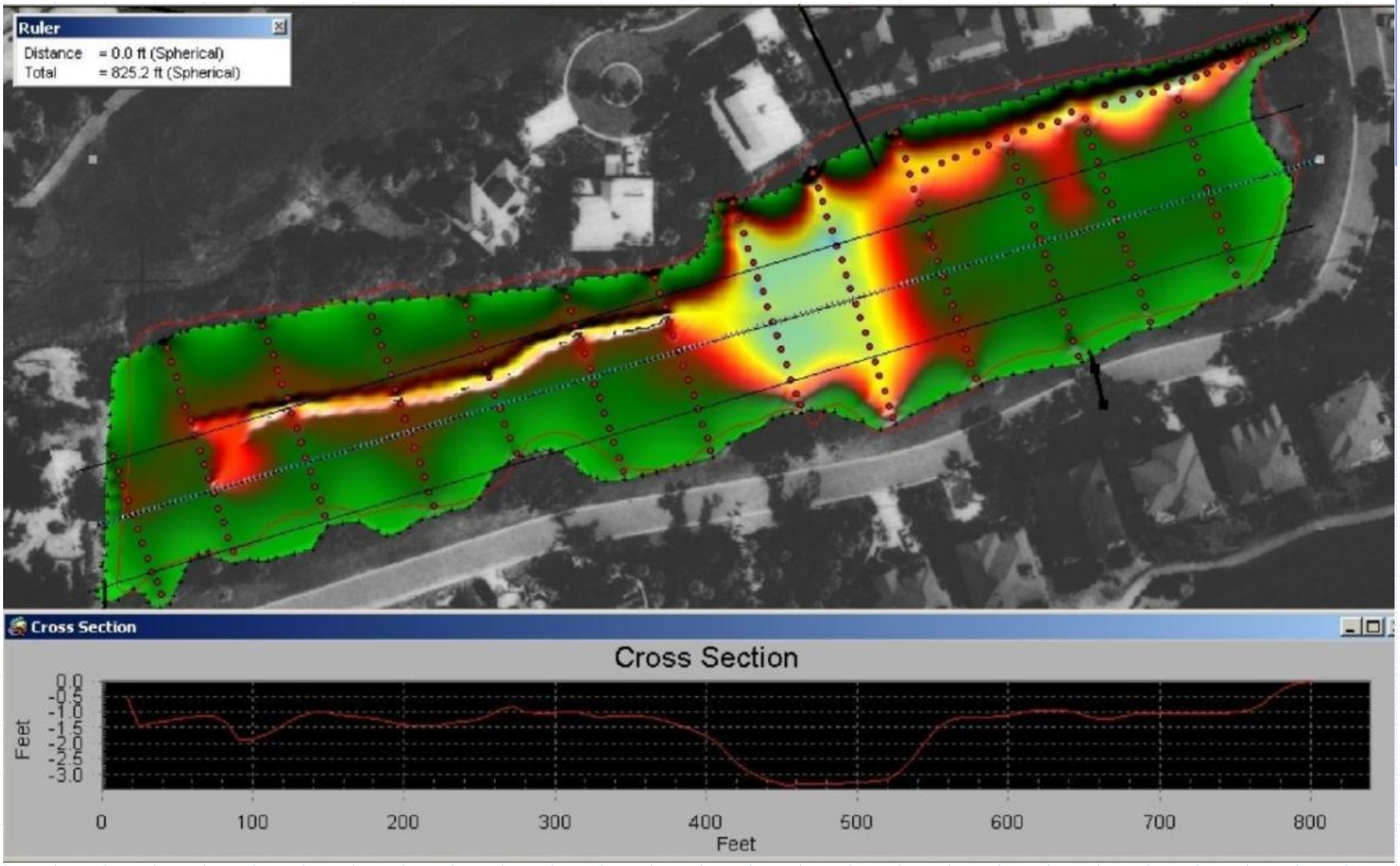
- Best suited for targeted material removal
- Moderate cost/volume if volume is not larger
- Depth of pond is not generally a limiting issue
- Accessibility is not an issue
- Staging of material can be an issue
- Does not require that pond be able to be isolated and dewatered
- Does not requires that pond's stormwater function be bypassed
- Work typically performed by diver-operated dredge

Project Examples

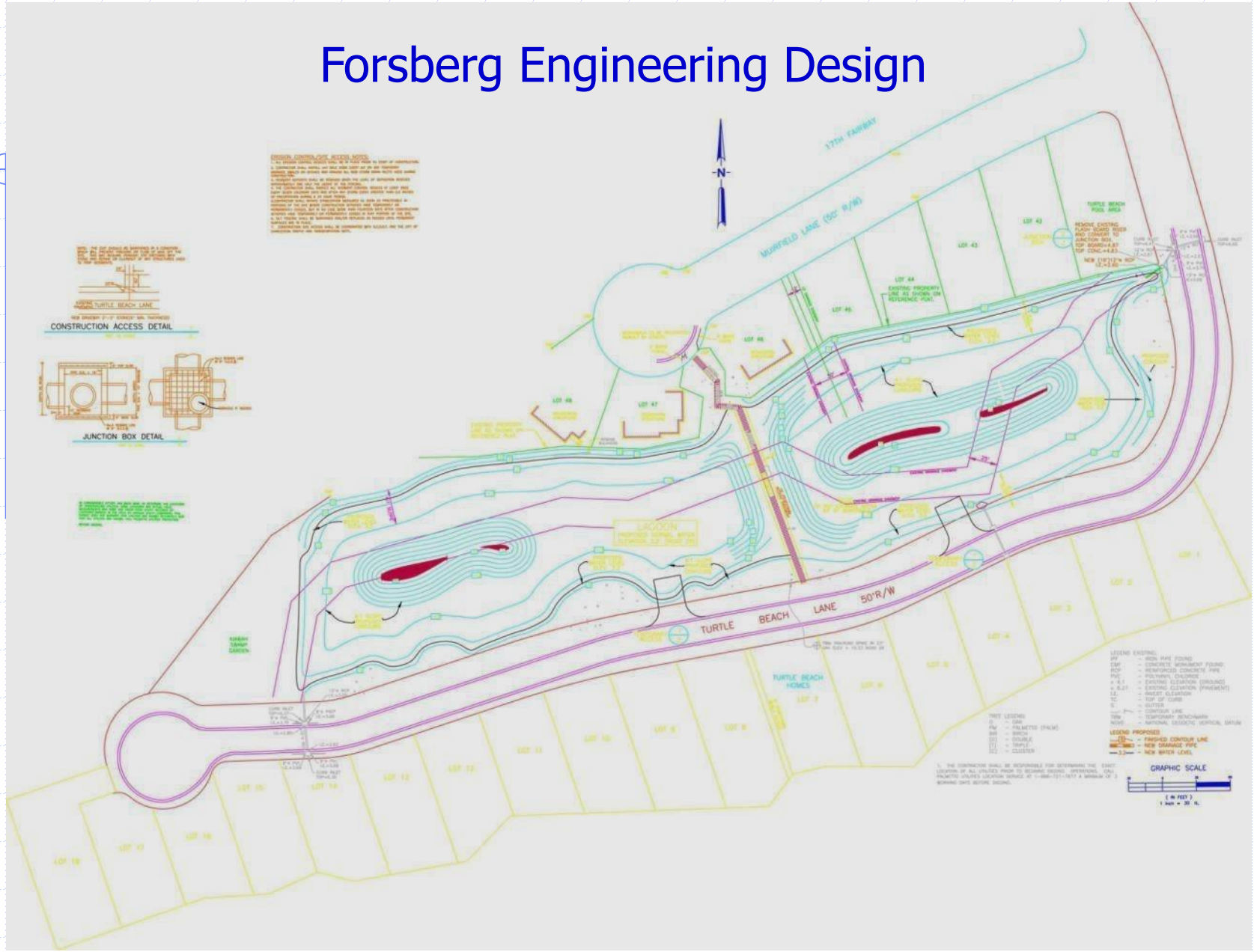




Pond 032 Excavation



Forsberg Engineering Design




2008-02-05

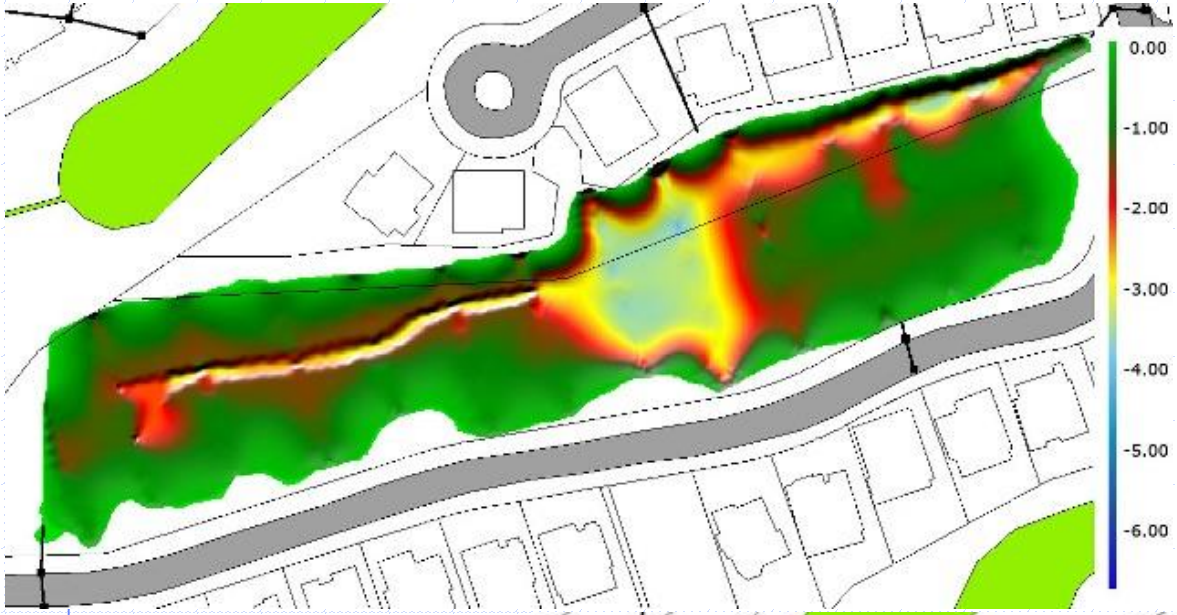

CAT
CAT
2008-02-20


2008-02-05

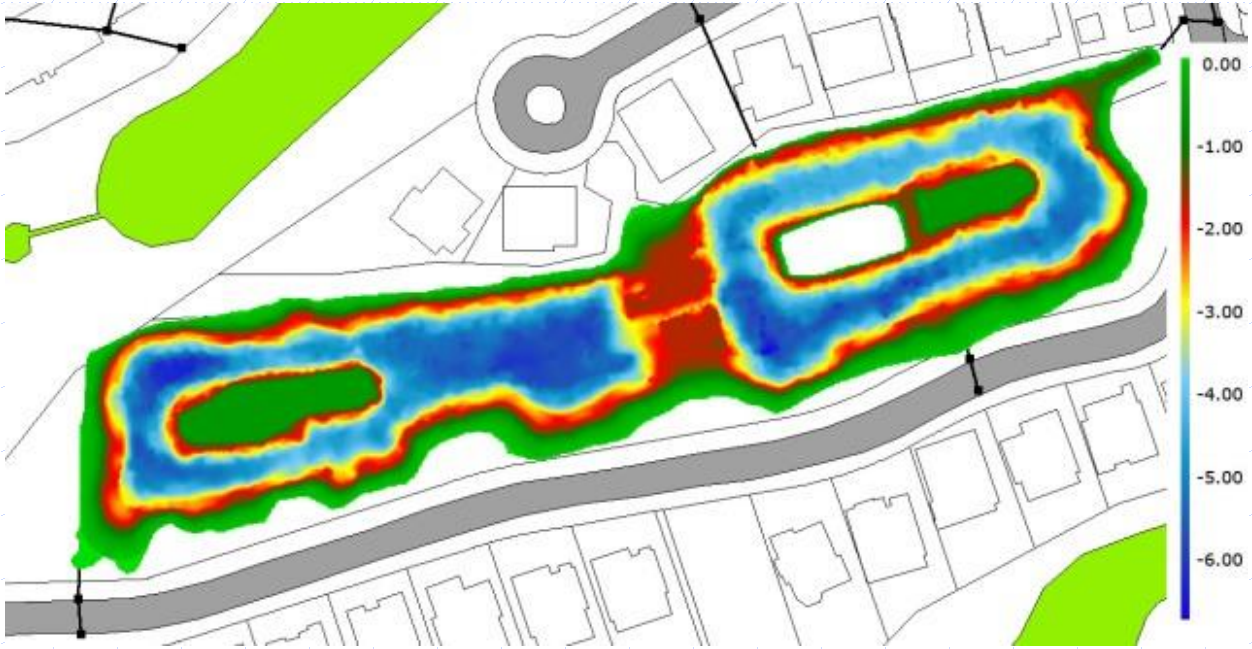

2008-02-22


2008-03-06


2008-03-06



2000



2008

Pond 032 Stats

Lake Info

- 2000 volume – 150,369 cubic feet
- 2008 volume – 312,960 cubic feet

- 2000 maximum depth – 3.5 feet
- 2008 maximum depth – 7.0 feet

- 2000 average depth – 1.30 feet
- 2008 average depth – 2.86 feet

Retention Pond Services

- 10,117 cubic yards removed
- Estimated volume to be removed 10,000 cubic yards

- Contract price – $272,000
- Completion price - $272,000

- Contract work period – 51 days (Jan 17th – Mar 17th)
- Completion work period – 17 days (Jan 21st – Mar 1st with 1 week taken off)

- Cost/cubic foot – $1.00

Costs

Pond Number	Date	Contractor	Method	Volume Removed (cubic feet)	Cost	Cost / Cubic Foot
015 / 020	2007-02-21	Eason Diving	Diver operated dredge / poly bags	554	$7,100.00	$12.82
016	2008-12-30	Eason Diving	Diver operated dredge / poly bags	361	$10,413.55	$28.83
023	2008-12-30	Eason Diving	Diver operated dredge / poly bags	281	$8,094.24	$28.83
024	2011-12-30	Eason Diving	Diver operated dredge / poly bags	1,918	$24,000.00	$12.51
077	1993-11-05	Otter Construction	Heavy equipment	1,242,000	$130,000.00	$0.10
054	1993-11-09	Otter Construction	Long-reach excavator	810	$2,800.00	$3.46
008	1999-12-09	Holland Environmental	Long-reach excavator	64,800	$27,050.00	$0.42
032	2008-03-01	Retention Pond Services	Long-reach excavator	273,159	$272,000.00	$1.00
085	2008-08-05	Retention Pond Services	Long-reach excavator	9,720	$6,656.00	$0.68
009	2008-08-07	Retention Pond Services	Long-reach excavator	2,430	$2,656.00	$1.09
014	2008-08-08	Retention Pond Services	Long-reach excavator	14,580	$14,016.00	$0.96
024	2002-09-26	Eadie's Drain & Vacuum	Vacuum truck	513	$3,840.00	$7.49
078	2002-09-26	Eadie's Drain & Vacuum	Vacuum truck	108	$800.00	$7.41
024	2007-60-30	Eadie's Drain & Vacuum	Vacuum truck / poly bags	1,485	$35,292.50	$23.77

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